

Claims 1, 3, 5-13, 15-16, 19-21 and 23-34 are pending in the subject application. Of those claims, claims 32-34 have been withdrawn as a result of a restriction requirement.

In the outstanding Office Action, the Patent Office rejects claim 31 under 35 U.S.C. § 112, first paragraph. In particular, the Patent Office alleges that "Page 9, lines 4-13, does not describe a method as required by claim 31 of producing an extracted biomass and a prehydrolyzate." (Action, page 2).

The Patent Office also rejects claims 23-31 under 35 U.S.C. § 112, second paragraph alleging that the word "that" should be changed to - -than- - in claim 23 and further alleging that the meaning and scope of "biomass" in claim 31 is unclear. (Action, page 3).

Applicants respectfully traverse the foregoing rejections. However, in the interest of advancing the prosecution of the application, claims 23 and 31 have been amended as suggested by the Patent Office. Accordingly, reconsideration and withdrawal of the § 112 rejections is believed to be warranted.

Referring to the rejections based upon art, the Patent Office rejects claims 1, 3, 5-10, 12-13, 15-16, 19-21 and 23-30 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent 5,081,026 to Heikkila et al. ("Heikkila"). The Patent Office also rejects claims 1, 3, 5-13, 15-16, 19-21 and 23-31 under 35 U.S.C. § 103 as being unpatentable over Heikkila in view of U.S. Patent 5,047,332 to Chahal ("Chahal") and under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-28 of Heikkila in

view of Chahal. Applicants respectfully traverse these rejections.

Applicants respectfully assert that the present claims are not anticipated by Heikkila or Chahal, nor rendered obvious by these references under § 103 or the judicially created doctrine of obviousness-type double patenting, whether the references are view alone or in combination. For example, each of Applicants' independent claims specify a ratio of glucose/xylose between about .25 to about 8, and glucose content greater than about 10% of carbohydrates. The claims also specify that during fermentation over about 50% of the xylose is converted to xylitol and over about 40% of the glucose is converted to ethanol, which is recovered by distillation. Support for the foregoing may be found throughout Applicants' specification at, for instances, the Examples.

Such an advantageous process of simultaneously producing xylitol and ethanol is not disclosed in, nor suggested by, the cited references. For example, in contrast to the present claims, the raw material of Heikkila has a high xylose content and a low hexose content. See, for instance, Example 2 of Heikkila disclosing a ratio of xylose/glucose of 21:1. The presently claimed process can produce both ethanol and xylitol in high yield, produce xylitol when the xylan/xylose content of raw material is low, and better utilize raw material and minimize waste product, as described in the previously submitted declaration under 37 C.F.R. § 1.132.

Applicants respectfully assert that the addition of the secondary reference Chahal, merely disclosing ethanol, does not disclose or suggest Applicants' advantageously claimed process steps for the simultaneous production of xylitol and ethanol.

In view of the amendments and remarks set forth herein, the subject application is believed to be in condition for allowance. Accordingly, a Notice of Allowance is respectfully requested.

The Examiner is invited to contact the undersigned attorney at 212-425-7200 if it is believed that a discussion would advance the prosecution of this application.

Respectfully submitted,

Dated: 11/21/02



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Marked-up Version Showing Changes Made
By The Present Amendment (37 C.F.R. § 1.121)

In the Claims:

Please amend claims 1, 5, 23 and 31 and cancel claim 10 as follows:

1. (Amended) A process for the simultaneous production of xylitol and ethanol from a [starting material of] hydrolyzed lignocellulose-containing material, comprising

→ providing a starting material of hydrolyzed lignocellulose-containing material, having a ratio of glucose/xylose, wherein the ratio of glucose/xylose is between about .25 to about 8, and glucose content is greater than about 10% of carbohydrates in the starting material;

fermenting said [hydrolyzed lignocellulose-containing material] starting material with a yeast strain which is capable of converting free xylose to xylitol and free hexose present to ethanol to form a fermented product comprising xylitol, ethanol and yeast, wherein during fermentation over about 50% of the xylose in the starting material is converted to xylitol and over about 40% of the glucose in the starting material is converted to ethanol;

recovering the resulting ethanol by distillation; [and chromatographically separating a xylitol-containing fraction from the remaining fermented product,] and

recovering xylitol by chromatographic separation from a bottom product of distillation [from said xylitol-containing fraction, wherein substantially all of the starting material is utilized].

5. (Amended) The process according to Claim 1, further comprising crystallizing pure

xylitol [from the xylitol-containing fraction obtained in the chromatography step].

Cancel claim 10.

23. (Amended) A process for the simultaneous production of xylitol and ethanol from a hydrolyzed [starting material of] lignocellulose-containing material, wherein the lignocellulose-containing material is selected from the group consisting of softwood, birch, beech, poplar, alder, plants, plant constituents, straw, hulls of wheat, corn, oat, barley, corn cobs, corn stems, nutshells, bagasse, cottonseed bran, wood chips, sawdust, sulphite spent liquor from woodpulp processing, waste from paper processing, ^{and} waste from woodpulp processing, comprising:

4 providing a starting material of the hydrolyzed lignocellulose-containing material, having a ratio of glucose/xylose, wherein the ratio of glucose/xylose is between about .25 to about 8 and wherein glucose content is greater than about 10% of carbohydrates in the starting material;

fermenting said [hydrolyzed lignocellulose-containing] starting material to produce a fermented solution with a yeast capable of converting free xylose present to xylitol and free hexose present to ethanol, said yeast selected from the group consisting of a yeast of the genera *Candida*, *Pichia*, *Pachysolen*, and *Debaryomyces*, said fermenting comprising reducing said free xylose to xylitol and reducing said hexose to ethanol, and said fermented solution comprising xylitol, ethanol, and spent yeast; wherein during fermentation over about 50% of the xylose in the starting material is converted to xylitol and over about 40% of the glucose in the starting material is converted to ethanol;

separating a substantial portion of said spent yeast from said fermented

solution to produce a substantially clarified solution comprising ethanol and xylitol, said clarified solution comprising substantially less spent yeast by weight on a dry solids (substance) basis [that] than said spent yeast in said fermented solution, and said separating comprising at least one separating method selected from group consisting of filtration, centrifugation and decanting;

recovering ethanol by distillation;

recovering xylitol by chromatographic separation; and

crystallizing said xylitol to produce xylitol crystals[; wherein substantially all of the starting material is utilized].

31. (Amended) A process for the simultaneous production of xylitol and ethanol from a starting material of lignocellulose-containing material, comprising:

partially hydrolyzing said lignocellulose-containing material and subjecting said material to extraction to produce a prehydrolysate; wherein the prehydrolysate obtained from the extraction is fermented to convert xylose to xylitol, which is separated chromatographically and crystallized; wherein a final hydrolysis is carried out on the extracted material resulting in a hydrolysis product having a ratio of glucose/xylose, wherein the ratio of glucose/xylose is between about .25 to about 8 and wherein glucose content is greater than about 10% of carbohydrates in the starting material; the hydrolysis product being fermented to convert hexoses to ethanol, followed by recovery of the ethanol by distillation; wherein during fermentation over about 50% of the xylose in the hydrolysis product is converted to xylitol and over about 40% of the glucose in the hydrolysis product is converted to ethanol [separating said partially hydrolyzed lignocellulose-containing

material into an extracted biomass and a prehydrolyzate comprising free

xylose;

hydrolyzing said extracted biomass to produce an hydrolyzate comprising hexose;

said fermenting comprises

fermenting said hydrolyzate to produce a fermented solution comprising ethanol; and

fermenting said prehydrolyzate to produce a fermented solution comprising xylitol; wherein substantially all of the starting material is utilized].

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